

1 **CLAIMS**

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3 1. A method comprising:
4 assigning each of a plurality of segments comprising a received corpus to a
5 node in a data structure denoting dependencies between nodes; and
6 calculating a transitional probability between each of the nodes in the data
7 structure.

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9 2. A method according to claim 1, further comprising:
10 calculating a frequency for each elemental item of the segment; and
11 removing nodes of the data structure associated with items which do not
12 meet a minimum frequency threshold.

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14 3. A method according to claim 2, wherein the frequency of the item is
15 calculated by counting item occurrences throughout the subset and/or corpus.

16

17 4. A method according to claim 2, wherein the minimum threshold is
18 three (3).

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20 5. A method according to claim 1, further comprising:
21 managing storage of the data structure across a system memory of a
22 computer system and an extended memory of the computer system.

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24 6. A method according to claim 5, wherein the step of managing storage
25 of the data structure comprises:
 identifying least recently used nodes of the data structure; and

1 storing the least recently used nodes of the data structure in the extended
2 memory of the computer system when the data structure is too large to store
3 completely within the system memory.

4

5 7. A method according to claim 5, wherein the extended memory of the
6 computer system comprises one or more files on an accessible mass storage
7 device.

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9 8. A method according to claim 7, wherein the data structure represents
10 a language model, spread across one or more elements of a computing system
11 memory subsystem.

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13 9. A method according to claim 1, wherein calculating a transition
14 probability includes calculating a Markov transitional probability between nodes.

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16 10. A storage medium comprising a plurality of executable instructions
17 including at least a subset of which that, when executed by a processor, implement
18 a method according to claim 1.

19

20 11. A method for predicting a likelihood of an item in a corpus
21 comprised of a plurality of items, the method comprising:

22 building a data structure of corpus segments representing a dynamic context
23 of item dependencies within the segments;

24 calculating the likelihood of each item based, at least in part, on a likelihood
25 of preceding items within the dynamic context; and

1 iteratively re-segmenting the corpus to improve the calculated likelihood of
2 item dependencies.

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4 **12.** A method according to claim 11, wherein the method of building a
5 dynamic context of preceding dependent items comprises:

6 analyzing the data structure representing the language model;
7 identifying all items with dependencies to or from the item; and
8 using all items with dependencies to or from the item as the dynamic
9 context.

10

11 **13.** A method according to claim 11, wherein the language model
12 includes frequency information for each item within the model.

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14 **14.** A method according to claim 13, wherein calculating the likelihood
15 of the item comprises:

16 calculating a Markov transition probability for the item based, at least in
17 part, on the frequency of the items comprising the dynamic context.

18

19 **15.** A method according to claim 11, wherein calculating the likelihood
20 of the item comprises:

21 calculating a Markov transition probability for the item given the dynamic
22 context of items.

1 **16.** A storage medium having stored thereon a plurality of executable
2 instructions including instructions which, when executed by a host computer,
3 implement a method according to claim 11.

4

5 **17.** A data structure, generated by a computer system as a statistical
6 language model, the data structure comprising:

7 one or more root nodes; and

8 a plurality of subordinate nodes, ultimately linked to a root node,
9 cumulatively comprising one or more sub-trees, wherein each node of a
10 sub-tree represents one or more items of a corpus and includes a measure of
11 a Markov transition probability between the node and another linked node.

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13 **18.** A data structure according to claim 17, wherein the root node
14 represents a common root item for all subordinate nodes in the one or more sub-
15 trees.

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17 **19.** A data structure according to claim 17, wherein the Markov
18 transition probability is a measure of the likelihood of a transition from one node
19 to another node based, at least in part, on the one or more items represented by
20 each of the nodes.

21

22 **20.** A data structure according to claim 17, wherein the items include
23 one or more of a character, a letter, a number, and combinations thereof.

1 **21.** A data structure according to claim 17, wherein the data structure
2 represents a dynamic order Markov model (DOMM) language model of the textual
3 source.

4

5 **22.** A storage medium comprising a plurality of executable instructions
6 which, when executed by a processor, implement a data structure according to
7 claim 17.

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9 **23.** A memory subsystem in a computer system including one or more of
10 a cache memory, a system memory and extended memory having information
11 stored therein which, when interpreted by a processor of the computer system,
12 represent a data structure according to claim 17.

13

14 **24.** A modeling agent comprising:
15 a controller, to receive a corpus; and
16 a data structure generator, responsive to and selectively invoked by the
17 controller, to assign each of a plurality of segments comprising the received corpus
18 to a node in a data structure denoting dependencies between nodes;

19 wherein the modeling agent calculates a transitional probability between
20 each of the nodes of the data structure to determine a predictive capability of a
21 language model represented by the data structure and iteratively re-segments the
22 received corpus until a threshold predictive capability is reached.

1 **25.** A modeling agent according to claim 24, the data structure generator
2 comprising:
3

4 a dynamic segmentation function, to iteratively re-segment the received
5 corpus to improve language model predictive capability.
6

7 **26.** A modeling agent according to claim 24, the data structure generator
8 comprising:
9

10 a frequency analysis function, to analyze a frequency of occurrence of
11 segments within the corpus.
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13 **27.** A modeling agent according to claim 26, wherein segments that do
14 not meet a frequency of occurrence threshold are removed from the data structure,
15 reducing data structure size and improving language model predictive capability.
16

17 **28.** A storage medium comprising a plurality of executable instructions
18 including at least a subset of which, when executed, implement a language
19 modeling agent to assign each of a plurality of segments of a received corpus to a
20 node in a data structure denoting dependencies between nodes, and to calculate a
21 transitional probability between each of the nodes in the data structure to
22 determine a predictive capability of a language model denoted by the data
23 structure, wherein the modeling agent dynamically re-segments the received
24 corpus to remove segments which do not meet a minimum frequency threshold to
25 improve one or more language model performance attributes.
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1 **29.** A storage medium according to claim 28, wherein the one or more
2 language model performance attributes include a predictive capability.
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